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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:
KAZUYUKI SAKAMAKI
Serial No: 09/870,279
Filed: May 30, 2001
For: GEAR MADE OF RESIN, IMAGE-
FORMING DEVICE, AND
ROTATION-TRANSMITTING
MEANS MADE OF RESIN

Art Unit: 3682
Examiner: David M. Fenstermacher

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Mail Stop: Appeal Brief-Patents

Dear Sir:

This is an Appeal from the Final Rejection from the Examiner of Group Art Unit 3682,
dated January 6, 2005, rejecting the Claims 1-6, 8 and 9.

STATUS OF THE CLAIMS:

A. Rejection of the Specification and Claims on Non-Reference Grounds

As stated in the Advisory Action, which entered the Rule 116 Amendment, the Rule 116 Amendment overcame the Non-Reference Grounds Rejection of the Claims 8 and 9.

B. Rejection of the Claims on Reference Grounds

1. Claims 1 and 3-6 are rejected under 35 U.S.C. 103 as being unpatentable over Japanese 10-278124 in view of Williams, et al. In support of his position, the Examiner states:

JP 10-278124 discloses in figures 1a and 1b, a plastic gear having teeth 3 on an annular portion thereof, a shaft supporting member 2; at least two circumferential ribs including a radially outermost circumferential rib 5 located outside of an intermediate point located between a rotation center of said gear and an outermost circumference of said gear and a radially innermost circumferential rib 6; a plurality of radially extending diametrical ribs 7 extending from an innermost side of said outermost annular rib toward said shaft supporting member; a plurality of radially extending diametrical ribs 8 extending between said innermost circumferential rib and said shaft supporting member; and a first web portion 4 located between said outermost circumferential rib and said teeth. JP 10-278124 does not disclose said web portion being corrugated. However, Williams teaches in figures 1 and 3 and in lines 23-25 of column 2, a plastic gear having a corrugated web portion, wherein said web portion may comprise curvilinear, two-sided, or three-sided corrugations. Therefore, it would have been obvious to one of skill in the art at the time of the invention to modify the apparatus of JP 10-278124 in view of Williams et al. to form the first web portion with corrugations to increase the axial strength of the gear without significantly increasing the required material of construction.”

In further support of his position, the Examiner states:

“Regarding Claim 6, the reference combination previously set forth discloses the basic apparatus except for the thickness of said first web portion being the same as a thickness of a second portion located between said shaft supporting member and said annular ring 6. However, it would have been obvious as a matter of engineering design choice to make the thickness of said first web portion the same as the thickness of said second web portion, because such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art.”

Still further in support of his position, the Examiner states:

“Regarding claims 8 and 9 as best understood, the reference combination previously set forth discloses the basic apparatus except for the number of radially extending diametrical ribs extending from an innermost side of said outermost circumferential rib towards said shaft supporting member being substantially the same as the number of radially extending diametrical ribs extending between said innermost circumferential rib and said shaft supporting member. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to increase the number of diametrical ribs between said shaft supporting portion and said innermost circumferential rib, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art.”

2. The Claim 2 has been rejected under 35 U.S.C. 103 as being obvious over JP 10-278124 in view of Williams et al. as applied to Claims 1 and 3 above and further in view of Mlenjnek et al. In support of his position, the Examiner states:

“The reference combination previously set forth discloses the basic apparatus but does not disclose said plastic gear used to drive an image-forming device. However, Mlenjnek et al. teaches in figure 4 a laser printer drive train having drive means 31,32 which drive a photoconductor drum 37 through a plastic gear 18. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the reference combination previously set forth in view of the teachings of Mlenjnek et al. to utilize a corrugated plastic gear in a drive train of photoconductor apparatus to eliminate vibration transmitted to said drum and thus improve print quality.”

STATUS OF THE AMENDMENT:

The Rule 116 Amendment was sent by facsimile with a Certificate of Transmission on May 6, 2005, and was considered and entered by the Examiner; however, by the Advisory Action dated May 26, 2005, the Examiner indicated that the Rule 116 Amendment did not overcome the rejections based upon reference grounds for the reasons of record.

SUMMARY OF THE INVENTION:

The present invention relates to a gear made of resin (page 9, line 17). Particularly, the gear comprises a shaft supporting portion (page 9, lines 22 and 24) formed at a radially inner

location around a rotational center of the tooth portion, the substantially annular tooth portion is formed at a radially outer location relative to the shaft supporting portion (page 10, lines 1 and 2) and a web connects the shaft supporting portion and the tooth portion to each other (page 9, line 23-page 10, line 2).

In addition, at least two circumferential ribs are formed concentrically with the tooth portion and are radially provided between the shaft supporting portion and the tooth portion (page 10, lines 4-10), and a plurality of radially extending diametrical ribs are provided extending radially from an innermost side of a radially outermost of the at least two circumferential ribs toward the shaft supporting portion (see page 10, lines 11-20). Still further, the radially outermost of the at least two circumferential ribs is formed outside of an intermediate point in the radial direction between the rotational center of the gear and the outermost circumference of the gear, or in other words, more than halfway from the center of the gear to the annular tooth portion (figures 1 and 2). Still further, the web between the radially outermost of the at least two circumferential webs and the substantially annular tooth portion has a circumferential sectional shape which is substantially corrugated (see page 10, line 21-page 11, line 8). Also, the circumferential sectional shape of the web is a corrugated shape contoured as a smooth curve (page 13, lines 21-24 and figure 3) or is triangles continuously connected together (page 13, lines 8-14 and figure 5).

REFERENCES CITED:

A. JP 10-278124

Appellant has carefully reviewed JP'124 and respectfully submits that shown therein is the prior art shown in Figures 7 and 18 of Appellant's application and which is described at pages 3 and 4 of the prior art section of Appellant's application (namely third prior art). In addition, Appellant respectfully submits that JP'124 has the disadvantages and does not achieve the desired results which are described at page 4, lines 9-21, all of which are achieved by Appellant's invention.

In particular, JP'124 discloses a gear comprising a shaft support portion 2, a tooth annular portion 3, at least two circumferential ribs provided between the shaft support portion and the annular tooth portion, radially extending ribs from the shaft support portion to the inner side of the outermost of the two circumferential ribs, and a flat web of uniform thickness

provided between the outermost surface of the outermost circumferential rib and the inner surface of the annular tooth portion. Still further, the shaft support portions and the radial and circumferential ribs all have particular defined thicknesses T1-T7. Appellant respectfully submits that these particular thicknesses and the circumferential and radial ribs are all provided in order to provide a rigid structure with as much accuracy as such a structure can provide. Still further and to also further reinforce the structure, the number of ribs between the two circumferential ribs is greater in number than the number of ribs provided between the shaft support portion 2 and the innermost circumferential rib 6.

B. Williams et al., United States Patent No. 3,361,004

Williams et al. discloses a plastic gear comprising a substantially annular tooth portion 13 surrounding a shaft support portion 11 with a corrugated web provided between the shaft support and the substantially annular tooth portion. No circumferential ribs or radial ribs are provided at all. This corrugated web is for the purpose of stiffening any relatively long web which extends between the shaft support portion and the annular gear portion.

Consequently, Appellant respectfully submits that Williams et al. does not disclose that one would reinforce the relatively small web which exists between an outermost circumferential web and the annular tooth portion.

ISSUES:

A. The Claims 1, 3-6, 8 and 9 were finally rejected by the Examiner as being obvious over JP'124 in view of Williams et al., and it is Appellant's position that not only is the combination suggested by the Examiner not Appellant's invention, but also there is no suggestion in JP'124 or Williams et al. to make the combination suggested by the Examiner and one of ordinary skill in the art would not have made the combination which the Examiner has suggested, and therefore, the Claims 1, 3-6, 8 and 9 are not obvious over the cited art.

B. The Claim 2 was finally rejected by the Examiner as being obvious over JP'124 in view of Williams et al., and further in view of Mlenjnek et al., and it is Appellant's position that not only is the combination suggested by the Examiner not Appellant's invention, but also there is no suggestion to one of ordinary skill in the art in JP'124, Williams et al. and/or Mlenjnek et al. to make the combination suggested by the Examiner, and therefore, the Claim 2 is not obvious over the cited art.

ARGUMENT:

Appellant would like to first point out that as is described in the prior art section of Appellant's application, the existing or prior art resin gears, such as that of JP'124, while originally achieving the desires of manufacturers to provide a resin gear with high tooth profile accuracy and a high rotation-transmitting accuracy, such gears with the advent for image forming devices such as color printers, color duplicators and the like which require an even greater rotation-transmitting accuracy, have become inadequate. It is the object of Appellant's invention to provide a resin gear with even higher accuracy to prevent color shift during printing to enable a further clear printing, and do so while providing reduced vibration and noise during operation so as to provide a quiet environment in the workplace. Appellant respectfully submits that gears such as those made in JP'124 are incapable of providing and achieving these results.

In particular, Appellant refers the Examiner to the prior art section of Appellant's application, and in particular the (third prior art) and to the description of the teachings of JP'124 which are described in Appellant's brief above. From this, it is clear that the construction of the resin gear of JP'124 is patentably different from Appellant's invention. In particular, in an attempt to provide a more accurate resin gear, the inventor of JP'124 created or invented a gear with a particular construction so as to be rigid and stiff and provide high accuracy. This construction consists of radially extending diametrical ribs and circumferential ribs; however, between the outermost circumferential rib and the angular gear teeth is provided a straight web, and it was believed by the inventor of JP'124 that such a construction with the particular thicknesses of the materials would provide sufficient stiffness and rigidity and accuracy. Accordingly, there is no suggestion in JP'124 to replace the straight web existing between the outermost circumferential rib and the angular teeth with any other shape or construction. In particular, there is no suggestion, teaching or showing in JP'124 that one would replace this small portion 11 of straight web with a corrugated web.

Appellant has carefully reviewed Williams et al., and respectfully submits that Williams et al. suggests that if one wants to reinforce or stiffen a plastic gear, one should provide a corrugated web which extends from the shaft support to the annular gear (see column 1, lines 45-51 and 56-59).

In view of the teachings of Williams et al., Appellant respectfully submits that Williams et al. would suggest or teach one of ordinary skill in the art to replace the radially extending

diametrical ribs and circumferential ribs of JP'124 which are provided between the shaft support and the annular gear with a corrugated web which extends from the shaft support to the annular gear. Such a construction would not be Appellant's invention.

In addition, Appellant respectfully submits that in order to combine the teachings of two different references in order to make an invention obvious, there must be some suggestion in the art to make the particular combination (see In re Sernaker, 217 USPQ1 (CFC 1983)).

Accordingly, Appellant respectfully submits that there is no suggestion in Williams et al., and particularly no suggestion in JP'124 that one would only replace the small portion of the straight web of JP'124 with a corrugated web such as in Appellant's invention. Therefore, Appellant respectfully submits that there is no suggestion to make the combination suggested by the Examiner.

Furthermore, Appellant respectfully submits that the corrugations of Williams et al., as shown in figures 3 and 5, are either trapezoidal, rectangular or square. In contrast thereto, Appellant's invention claimed by Claims 4 and 5 requires that the corrugated shape be a smooth curve or comprise triangles continuously connected together and such a structure is not shown or suggested by Williams et al., and there is no suggestion in Williams et al. that a smooth curve or triangles continuously connected together would be an equivalent of that shown in figures 3 and 5 of Williams et al.

Still further, Appellant respectfully submits that as to the particular thicknesses claimed by Appellant's Claim 6, Appellant respectfully submits that the thicknesses claimed in Appellant's Claim 6 are different from the particular thicknesses shown and described in JP'124. Since the particular thicknesses of JP'124 are provided for a particular result, Appellant respectfully submits that one of ordinary skill in the art would not vary those thicknesses to create Appellant's invention, and the creation of Appellant's invention is not just a mere change in the size of a component.

As to Claims 8 and 9 of Appellant's application, Appellant respectfully submits that the number of radially extending diametrical ribs provided and claimed in the two areas of Appellant's resin gear are substantially the same. However, the number of radially extending diametrical ribs in JP'124 in the same two areas are substantially different, and there is no suggestion that they would be made the same or there would be a requirement to increase the number of ribs in the inner area.

Finally, looking at the Examiner's rejection of Claim 2, Appellant respectfully submits that Appellant's arguments concerning Appellant's invention, Williams et al., and JP'124 are equally applicable to this rejection. As a result, Appellant will not again make them at this point in Appellant's Brief for the sake of brevity. However, Appellant has carefully reviewed Mlenjnek et al., and respectfully submits that while Mlenjnek et al. may disclose the use of a plastic gear in a laser printer, there is no suggestion or teaching in Mlenjnek et al. that the plastic gear would require any particular precision.

In view of the above, therefore, Appellant respectfully submits that the Claims 1, 3-6, 8 and 9 are not obvious over JP'124 in view of Williams et al., and that the Claim 2 is not obvious over JP'124 in view of Williams et al. and further in view of Mlenjnek et al.

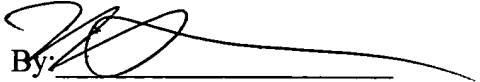
CONCLUSION:

- A. The finally rejected Claims 1, 3-6, 8 and 9 are not obvious over the cited art.
- B. Allowance of the Claims 1-6, 8 and 9 are earnestly solicited.
- C. An oral hearing is requested, and it is respectfully requested that the fee in the amount of \$1,000.00 be charged to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.
- D. This Appeal Brief is submitted herewith in triplicate, and it is further requested that the filing fee for the Appeal Brief of \$500.00 be charged to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.

Please charge any additional costs incurred by or in order to implement this Appeal Brief or any additional fees required for any extensions of time in order to enter this Appeal Brief to KODA & ANDROLIA DEPOSIT ACCOUNT NO. 11-1445.

Respectfully submitted,

KODA & ANDROLIA

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APPENDIXREJECTED CLAIM UPON WHICH APPEAL IS TAKEN:

Claim 1: A gear made of resin, comprising a substantially annular toothed portion formed at a radially outer location, a shaft-supporting portion formed at a radially inner location around a rotational center of said toothed portion, a web connecting said shaft-supporting portion and said toothed portion to each other, wherein

at least two circumferential ribs are formed concentrically with the toothed portion and radially provided between said shaft-supporting portion and said toothed portion,

a plurality of radially extending diametrical ribs are provided extending radially from an innermost side of a radially outermost of said at least two circumferential ribs toward said shaft supporting portion,

said radially outermost of said at least two circumferential ribs being formed outside of an intermediate point in the radial direction which is between the rotational center of the gear and the outermost circumference of the gear, and

the circumferential sectional shape of said web between said radially outermost of said at least two circumferential ribs and said toothed portion is a substantially corrugated shape.

Claim 2: An image-forming device comprising a gear made of a resin according to claim 1, and a drive means for driving a photoconductor through said gear made of the resin.

Claim 3: A rotation-transmitting means made of a resin, comprising a substantially annular toothed portion formed at a radially outer location, a shaft-supporting portion formed at a radially inner location around a rotational center of said toothed portion, a web connecting said shaft-supporting portion and said toothed portion to each other, wherein

said web has at least two circumferential ribs formed thereon concentrically with said toothed portion,

a plurality of radially extending diametrical ribs are provided between said shaft-supporting portion and an innermost side of a radially outermost of said at least two of said circumferential ribs,

said radially outermost of said at least two circumferential ribs being formed outside of an intermediate point in the radial direction which is between the rotational center of the gear and the outermost circumference of the gear, and

the circumferential sectional shape of said web between an outermost side of said radially outermost of said at least two circumferential ribs and said toothed portion is a substantially corrugated shape.

Claim 4: The gear according to claim 1, wherein said circumferential sectional shape of said web is a corrugated shape contoured by a smooth curve.

Claim 5: The gear according to claim 1, wherein said circumferential sectional shape of said web is corrugated shape comprising triangles continuously connected together.

Claim 6: The gear according to Claim 4, wherein a thickness of said web that has said circumferential sectional shape which is said corrugated shape contoured by said smooth curve is substantially equal to a thickness of said web between the shaft-supporting portion and said at least one circumferential rib.

Claim 7: (cancelled).

Claim 8: The gear according to Claim 1, wherein a number of said plurality of radially extending diametrical ribs extending between said shaft-supporting portion and an innermost of said at least two circumferential ribs is substantially equal to a number of said plurality of radially extending diametrical ribs extending between said at least two circumferential ribs.

Claim 9: The gear according to Claim 3, wherein a number of said plurality of radially extending diametrical ribs extending between said shaft-supporting portion and an innermost of said at least two circumferential ribs is substantially equal to a number of said plurality of radially extending diametrical ribs extending between said at least two circumferential ribs.